

INDIANA UNIVERSITY

TRANSPORTATION RESEARCH CENTER

ON-SITE AMBULANCE CRASH INVESTIGATION

CASE NUMBER - IN11015

LOCATION - INDIANA

VEHICLE - 2010 CHEVROLET EXPRESS G4500 TYPE III AMBULANCE

CRASH DATE - April 2010

Submitted:

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

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15. <i>Supplementary Notes</i> On-site side ambulance crash investigation involving a 2010 Chevrolet Express G4500 Type III Ambulance.			
16. <i>Abstract</i> The focus of this on-site investigation was the damage to a 2010 Chevrolet Express G4500 Type III ambulance and the sources of the injuries to driver, patient, and Emergency Medical Technician (EMT). This crash occurred within the 6-leg intersection of a state highway and two rural roadways. The ambulance was traveling southeast on the highway without the emergency lights and siren activated. The Chrysler was traveling north on a rural roadway. The ambulance was occupied by a restrained 31-year-old male driver and an unrestrained 42-year-old male EMT who was attending to a 47-year-old female patient. The patient was restrained on a Stryker 6500 Power Pro XT patient cot. The patient was a paraplegic. She was being transported from her home to a hospital for treatment of a displaced feeding tube. As the ambulance was traveling southeast through the intersection, it was impacted on the right plane (event 1) by the front plane of the northbound Chrysler. The ambulance rotated clockwise and departed the left side of the roadway where it rolled over (event 2), right side leading, four quarter turns. During the rollover, the rail clamp frame on the patient cot fractured and the cot separated from the antler bracket and rail clamp. The cot contacted the right side, roof, and left side of the patient compartment during the rollover. The patient remained restrained on the cot throughout the rollover and came to final rest on the floor of the patient compartment with the cot on top of her. The vehicle came to final rest on its wheels heading east. The driver was transported by ground ambulance to a hospital. The EMT and patient were transported by ground ambulance to a trauma center. The driver was treated in the emergency room and released. The EMT and patient were admitted for treatment of their injuries. The patient expired six days following the crash.			
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ON-SITE AMBULANCE CRASH INVESTIGATION

CASE NUMBER - IN11015

LOCATION - INDIANA

VEHICLE - 2010 CHEVROLET EXPRESS G4500 TYPE III AMBULANCE

CRASH DATE - April 2011

BACKGROUND

The focus of this on-site investigation was the damage to a 2010 Chevrolet Express G4500 Type III ambulance (**Figure 1**) and the sources of the injuries to the driver, patient, and Emergency Medical Technician (EMT). This crash was brought to the attention of the National Highway Traffic Safety Administration (NHTSA) on April 22, 2011 by Special Crash Investigation Team 2, which identified the crash through an internet search of news articles. This crash was subsequently brought to NHTSA's attention by Special Crash Investigation Team 3 through the same process. This investigation was assigned on May 9, 2011. The crash occurred in April, 2011, at 1445 hours, in Indiana and was investigated by the county sheriff's department. The crash involved the ambulance and a 2004 Chrysler Town & Country minivan. The crash scene, ambulance, and Chrysler were inspected on May 11, 2011. The driver of the ambulance was interviewed on May 11, 2011. The director of operations of the ambulance service was interviewed on May 24, 2011. Attempts to interview the EMT were unsuccessful.



Figure 1: The damaged 2010 Chevrolet Express Type III ambulance

This crash occurred within the 6-leg intersection of a state highway and two rural roadways. The ambulance was traveling southeast on the highway without the emergency lights and siren activated. The Chrysler was traveling north on a rural roadway. The ambulance was equipped with frontal air bags and a type III patient compartment. The ambulance was occupied by a restrained 31-year-old male driver and an unrestrained 42-year-old male EMT who was attending to a 47-year-old female patient. The patient was restrained on a Stryker 6500 Power Pro XT patient cot. The patient was a paraplegic. She was being transported from her home to a hospital for treatment of a displaced feeding tube. The driver was transported by ground ambulance to a hospital. The EMT and patient were transported by ground ambulance to a trauma center. An air ambulance was initially requested for the patient but was canceled since the patient was conscious, alert, and communicating with medical personal and police. The driver was treated in the emergency room and released. The EMT and patient were admitted for treatment of their injuries. The patient expired six days following the crash. The Chrysler was a 4-door minivan

that was occupied by a 60-year-old female driver who sustained police-reported A (incapacitating) injuries. She was transported by ground ambulance to a hospital. Her injury and treatment status were not determined.

The ambulance service was part of a municipal fire department in a central Indiana city with a population of approximately 6,700. The service operated two ambulances and provided 9-1-1 service to a 97 square mile area. The ambulance service was staffed with a combination of full time employees and volunteers. The service provided 20 hours of in-house driver training each year to all their drivers. The training included eight hours of classroom instruction, eight hours of behind-the-wheel training, and review by a shift supervisor. The driver of the subject ambulance was not an EMT. He had been an ambulance driver for 14 years and had been a volunteer with this ambulance service for two weeks. He had completed an emergency vehicle operators course during his tenure with another ambulance service. The ambulance driver did not have a specific duty schedule and was called in on an as-needed basis. On the day of the crash, he was called to duty one hour prior to the crash. The EMT was a full time employee and had been with the ambulance service for 10 years. His duty schedule comprised 24 hours on duty and 24 hours off duty for five days, then off duty for four days. On the day of the crash, he had been on duty since 0700 hours.

CRASH SUMMARY

Crash Site: This crash occurred during nighttime hours and clear weather conditions within a 6-leg intersection of a 2-lane state highway and two 2-lane rural roadways. The ambulance was traveling on the state highway, which traversed in a southeast-northwest direction. There was one lane in each direction and the roadway was bordered by bituminous shoulders. Each lane was approximately 3.6 m (11.8 ft) in width and each shoulder was 1.1 m (3.6 ft) in width. The roadway pavement markings for southeastbound traffic consisted of solid white edge lines and a double yellow center line. The Chrysler was traveling on a 2-lane rural roadway that traversed in a north-south direction. There was one lane in each direction and the roadway was bordered by grass shoulders. Each lane was approximately 3 m (9.8 ft) in width and each grass shoulder was approximately 1 m (3.3 ft) in width. Roadway pavement markings consisted of solid white edge lines, a solid yellow lane line for northbound traffic, a broken yellow lane line for southbound traffic, and a solid white stop bar at the intersection. The roadway was controlled by a stop sign. The roadway surface was dry bituminous and the grade for both vehicles was level. The speed limit was 89 km/h (55 mph) for both vehicles. The Scene Diagram is on page 18 of this report.

Pre-Crash: The ambulance was traveling southeast (**Figure 2**) and the driver intended to continue straight through the intersection. The



Figure 2: Approach of the ambulance southeast to the intersection, number indicates 50 m (164 ft) to impact area

Chrysler was traveling north approaching the stop sign at the intersection (**Figure 3**). The driver of the Chrysler told police that she was not familiar with the roadway and did not see the stop sign as she approached the intersection. The driver of the ambulance stated during the SCI interview that he steered left to avoid the crash but did not have time to apply the brakes. The ambulance was equipped with an Event Data Recorder (EDR), which recorded 2.5 sec of pre-crash data. For each of the five pre-crash recording intervals, the EDR reported the ambulance traveling 100 km/h (62 mph) with the brake switch circuit reported as “Off.” Percent throttle was reported as 100% for the last two recording intervals.

Crash: The right plane of the ambulance (**Figure 4**) was impacted by the front plane of the Chrysler (**Figure 5**, event 1). The force direction on the ambulance was within the 1 o’clock sector and the impact did not trigger deployment of the driver’s frontal air bag. The driver’s frontal air bag in the Chrysler deployed. The ambulance rotated clockwise 205 degrees as it traversed 32 m (105 ft) and departed the roadway (**Figure 6**). It rotated clockwise an additional 60 degrees as it traversed an additional 7 m (23 ft) and rolled over (event 2), right side leading, four quarter turns. The vehicle traversed a distance of 27 m (88.6 ft) during the rollover and came to final rest on its wheels heading east (**Figure 7**). The Chrysler rotated clockwise 120 degrees as it traversed 5.8 m (19 ft) and came to final rest within the intersection heading southeast.

During the crash, the rail clamp frame on the patient cot fractured and the cot separated from the antler bracket and rail clamp. The cot impacted the right side, roof, and left side of the patient compartment during the rollover. The patient remained restrained on the cot throughout the rollover. She came to final rest on the floor of the patient compartment with the cot on top of her.



Figure 3: Approach of the Chrysler northbound to the intersection; number indicates 50 m (164 ft) to impact area



Figure 4: Damage to the right plane of the ambulance from impact with the Chrysler



Figure 5: Front plane damage to the Chrysler from the impact with the ambulance

Post-Crash: The police were notified of the crash at 2130 hours and arrived on scene at 2137 hours. Emergency medical and rescue services also responded to the crash scene. The driver of the ambulance exited the vehicle without assistance through the left front window. Emergency medical personnel removed the patient and the EMT through the patient loading doors. The driver was transported by ground ambulance to a hospital. The EMT and patient were transported by ground ambulance to a trauma center. The driver was treated in the emergency room and released. The EMT and patient were admitted for treatment of their injuries. The patient expired six days following the crash. Both vehicles were towed from the crash scene.

2010 CHEVROLET EXPRESS G4500 TYPE III AMBULANCE

DESCRIPTION

The Chevrolet was a rear wheel drive, 2-passenger, 2-door, cutaway van (VIN: 1GB9G5B63A1xxxxxx) manufactured in December of 2009. The final stage manufacturer of the ambulance was Braun Industries of Van Wert, Ohio. The ambulance model and vehicle number was Chief XL, 5465. The vehicle was equipped with a 6.6-liter, V-8 diesel engine, an automatic transmission, and anti-lock brakes. The front row was equipped with lap-and-shoulder safety belts, driver and front right passenger frontal air bags, and a tilt steering column that was adjusted to the center position. The patient compartment was equipped with a right side entry door, double rear doors for patient loading, and multiple storage cabinets along the left side, right side, and front. The windshield glazing was AS1 laminated and the front row glazing was AS2 tempered. The front row glazing was closed at the time of the crash. The specified wheelbase was 404 cm (159 in).

The vehicle manufacturer's recommended tire size was LT225/75R16. The vehicle was equipped with tires of the recommended size. The manufacturer's recommended cold tire pressure for the front tires was 448 kPa (65 psi) and 552 kPa (80 psi) for the rear tires. The tire data for the ambulance are presented in the table below.



Figure 6: Post-impact travel of the ambulance southeast to left side road departure



Figure 7: View southeast to the trip point of the ambulance (arrow in foreground); arrow in background shows location of final rest of the ambulance

<i>Position</i>	<i>Measured Pressure</i>	<i>Measured Tread Depth</i>	<i>Restricted</i>	<i>Damage</i>
LF	434 kPa (63 psi)	10 mm (12/32 in)	No	None
LR Outside	558 kPa (81 psi)	9 mm (11/32 in)	No	None
LR Inside	496 kPa (72 psi)	9 mm (11/32 in)	No	None
RR Inside	Flat	9 mm (11/32 in)	Yes	None
RR Outside	Flat	9 mm (11/32 in)	Yes	None
RF	Flat	10 mm (12/32 in)	No	Bead separated

The front row of the ambulance was equipped with box-mounted cloth covered seats and integral head restraints. The driver's seat track was adjusted to the rear position and the seat back was slightly reclined. The patient compartment had a box-mounted, forward-facing, vinyl covered seat behind the driver, a three passenger vinyl covered bench seat along the right side, and a single vinyl covered seat at the middle of the left side.

EXTERIOR DAMAGE

Exterior Damage, Event 1: The ambulance sustained right plane damage during the impact with the Chrysler. The direct damage resided on the right side of the patient compartment and began 132 cm (52 in) forward of the right rear axle extending 290 cm (114.2 in) rearward. The Field L was also 290 cm (114.2 in). The crush measurements were taken at the bottom of patient compartment and the maximum residual crush was 12 cm (4.7 in) occurring at C₃. The crush values were: C₁=0 cm, C₂= 0 cm, C₃=12 cm (4.7 in), C₄= 3 cm (1.2 in), C₅= 13 cm (5.1 in), C₆= 0 cm.

Damage Classification, Event 1: The Truck Deformation Classification (TDC) for the right plane impact was 01RBEWA. The WinSMASH reconstruction program could not be used to calculate a Delta V since heavy trucks are out of scope for the program. The System Status at Non-Deployment data block of the vehicle's EDR reported the maximum velocity change as 9.29 km/h (5.77 mph). The maximum longitudinal and lateral velocity changes reported on the EDR velocity change graphs were -6.57 km/h (-4.08 mph) and 5.75 km/h (3.57 mph), respectively.

Exterior Damage, Event 2: The ambulance sustained direct damage from the rollover on the top of the cab, top of the front portion of the patient compartment, right side of the patient compartment, and the left fender. The maximum vertical crush to the cab was approximately 2 cm (0.8 in) occurring at the windshield header. There was no lateral crush to the cab and no vertical or lateral crush to the patient compartment.

Damage Classification, Event 2: The TDC for the rollover was 00TDDO2. Based on the extent of the crush to the top plane, the severity of the damage was minor.

EVENT DATA RECORDER

The ambulance's EDR was imaged using version 3.7 of the Bosch Crash Data Retrieval software via the Diagnostic Link Connector (DLC). The EDR data was reported with version 4.3. The EDR reported a non-deployment event. Three associated events were detected but not recorded. The Supplemental Inflatable Restraint (SIR) warning lamp was reported as "Off." The safety belt switch circuit status for the driver was reported as "Unbuckled." The maximum recorded velocity change was reported in the System Status at Non-Deployment data block as 9.29 km/h (5.77 mph) occurring 200 ms following Algorithm Enable (AE). The maximum longitudinal and lateral velocity changes reported on the EDR velocity change graphs were -6.57 km/h (-4.08 mph) and 5.75 km/h (3.57 mph), respectively. The pre-crash data was discussed in the pre-crash section on page 2 of this report. The EDR report is attached at the end of this report.

INTERIOR DAMAGE

The interior of the vehicle's cab sustained minor damage from intrusion. The interior of the patient compartment sustained minor damage from contact by the displaced patient cot. The inspection of the front row of the ambulance revealed a scuff on the lower left instrument panel from contact by the driver's knees and left shin that was approximately 12 cm (4.7 in) in length. No other discernable occupant contact marks were observed. There was no deformation of the steering wheel.

The left and right front doors remained closed and operational. The right side entry door to the patient compartment remained closed but separated from the sliding track when opened by the driver following the crash. The patient compartment loading doors remained closed and operational. The windshield glazing was in place and cracked from impact forces. The remaining glazing was undamaged.

The front row sustained intrusions of the windshield, windshield header, and roof. The most severe intrusions of these components occurred in the center section of the front row where the windshield intruded approximately 3 cm (1 in).

The patient compartment was configured with storage cabinets on both sides and the front. All the medical supplies had been removed from the cabinets. The sliding plexiglass door on the left rear cabinet was broken. The hinged plexiglass door on the right rear cabinet was broken at the piano hinge from contact by the displaced patient cot during the rollover. The remaining cabinets were undamaged. A storage compartment for an oxygen cylinder was located at the right rear corner of the patient compartment. The oxygen cylinder had been removed. There was no damage to the oxygen compartment or visible oxygen supply lines and connectors. The exterior door to the oxygen compartment had been mechanically forced open following the crash. There were no intrusions of the patient compartment.

There were contact marks on the back right medical supply cabinet and roof of the patient compartment from contact by the displaced patient cot (**Figures 8 and 9**). The four areas of contact on the roof were located 58 cm (22.8 in), 100 cm (39.4 in), 208 in (81.9 in), and 263 cm (103.5 in) forward of the patient loading doors and approximately 67 cm (26.4 in) from the right wall of the patient compartment. There were also several possible occupant contact marks from the EMT on the ventilation duct on the roof.

Patient Cot: The cot that was used to transport the patient was a Stryker 6500 Power Pro XT (**Figure 10**), serial number 060240005. The cot was an aluminum X-frame design and its maximum weight capacity was 318 kg (700 lbs). It was equipped with a 24 volt battery hydraulic lift system. The standard length and width was 206 cm (81 in) and 58 cm (23 in), respectively. Its lowest adjustable position was 36 cm (14 in) and the highest was 105 cm (41 in). The cot was equipped with two torso restraints, two shoulder straps, and leg restraints. The ambulance driver stated during the SCI interview that the patient was secured on the cot by the torso and leg restraints. The shoulder straps were not used. She was facing rearward and her head/upper torso was elevated approximately 32 degrees.

The cot was secured by the ambulance's antler bracket and rail clamp. The antler bracket secures the head of the cot by restraining the undercarriage using the wheel frames as anchor points. The rail clamp secured the frame of the cot. The inspection of the cot revealed that the rail clamp frame was fractured and separated from the cot. **Figures 11 and 12** show the fracture sites at the head end of the cot. According to the driver, the rail clamp frame remained locked in the rail clamp. The cot's rail clamp frame was constructed of aluminum and consisted of an outer tube and inner tube. The fractures occurred to both ends of the inner tube. There were no welds at the ends of the outer tube. The cross sectional dimensions of the outer tube were 35 mm (1.4 in) x 30 mm (1.2 in) and the inner tube was 27 mm (1.1 in) x 24 (0.9 in) mm. The wall thickness of the outer tube was approximately



Figure 8: Yellow tape shows contact scuff marks from the displaced patient cot



Figure 9: Closer view of contact marks on the roof from the displaced patient cot



Figure 10: The Stryker 6500 Power Pro XT patient cot; arrow shows the separated rail clamp frame

2 mm (0.08 in), while the wall thickness of the inner tube was approximately 4 mm (0.2 in). The length of the broken rail clamp frame was 84 cm (33.1 in). The foot end of the rail clamp frame (**Figure 13**) was bent laterally approximately 6.4 cm (2.5 in). The lower right lift bar on the foot end of the cot was also fractured and bent forward 9 cm (3.5 in). The battery was separated from the cot.

MANUAL RESTRAINT SYSTEMS

The front row was equipped with driver and front right passenger lap-and-shoulder safety belts. The driver's safety belt was equipped with continuous loop belt webbing, a sliding latch plate, an Emergency Locking Retractor (ELR), and an adjustable upper anchor that was in the full-up position. The front right safety belt was similarly equipped but had an ELR/Automatic Locking Retractor (ALR). Both safety belts were equipped with buckle-mounted pretensioners, which did not actuate during the crash.

The inspection of the driver's safety belt assembly revealed historic usage scratches on the latch plate. There were no load marks on the belt webbing, latch plate belt guide, or D-ring. The EDR reported the driver's safety belt buckle switch status as "Unbuckled." The driver stated during the SCI interview that he was restrained. He reported contusions on the left shoulder and both hips that were consistent with usage of the safety belt.

In the patient compartment, the forward-facing EMT seat was equipped with a lap belt with a sewn latch plate and an ALR. The three lap safety belts on the crew bench seat on the right side of the patient compartment and the single seat on the left side were equipped with ALRs and sewn latch plates. The driver stated during the SCI interview that the EMT was not restrained at the time of the crash. The EMT had just taken airway supplies from the front left supply cabinet and was standing up when the initial impact occurred.



Figure 11: The fracture site of the rail clamp frame at the head end of the patient cot



Figure 12: The fracture site on the head end of rail clamp frame



Figure 13: The bent foot end of the rail clamp frame

The ambulance was equipped with dual stage driver and front right passenger frontal air bags and a front right passenger air bag suppression switch. The suppression switch was in the “on” position. Neither of the frontal air bags deployed in this crash.

2009 FORD E350 TYPE II AMBULANCE OCCUPANTS

DRIVER DEMOGRAPHICS

Age/Sex: 31 years/male
 Height: 191 cm (75 in)
 Weight: 75 kg (165 lbs)
 Eyewear: No
 Seat Type: Box mounted bucket
 Seat Track Position: Rear position
 Manual Restraint Usage: Lap-and-shoulder
 Usage Source: Driver interview
 Air Bags: Frontal, not deployed
 Alcohol/Drug Involvement: None
 Egress from Vehicle: Exited through left front window without assistance
 Transport from Scene: Ground ambulance
 Medical Treatment: Treated in hospital emergency room and released

DRIVER INJURIES

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1	Abrasions, mild, on top of scalp, not further specified	110202.1,9	Noncontact injury: flying glass, windshield glazing	Probable
2	Contusion posterior (back of) head, not further specified	110402.1,6	Other rear object: rear surface of cab	Probable
3	Contusions over bilateral (both) hips, not further specified	510402.1,3	Lap portion of safety belt system	Certain
4	Contusion on left shoulder, not further specified	710402.1,2	Torso portion of safety belt system	Certain
5	Abrasion left shin, not further specified	810202.1,2	Left lower instrument panel (includes knee bolster)	Probable
6	Contusions over bilateral knees, not further specified	810402.1,3	Left lower instrument panel (includes knee bolster)	Certain

Sources: Emergency Room Records, EMS treatment Record, and Interviewee Data–Driver. Injury Number 5 came from Emergency Room Records. Injury Numbers 2-4, and 6 came from Interviewee Data. Injury Number 1 came from a combination of ER Records and Interviewee Data.

The driver was restrained by the lap-and-shoulder safety belt and seated in an upright posture. He had his left hand on the steering wheel and right arm on the arm rest. The seat track was adjusted to the rear position and the seat back was slightly reclined. The impact by the Chrysler to the right plane of the ambulance displaced the driver forward and to the right opposite the 1 o'clock direction of force. The driver's knees and left shin contacted the lower left instrument panel, which caused contusions on both knees and an abrasion on the shin. The driver also reported contusions on the left shoulder and both hips from the safety belt. The driver rebounded and contacted the back of his head on the panel behind the driver's seat causing a contusion. During the rollover, the driver sustained small abrasions on the top of his head from flying glass fragments from the cracked windshield. The driver stated during the SCI interview that he exited the vehicle through the left front window without assistance. He was transported by ground ambulance to a hospital where he was treated in the emergency room and released.

OTHER ROW PASSENGER, EMT DEMOGRAPHICS

Age/Sex: 42 years/male
 Height: 188 cm (74 in)
 Weight: 164 kg (361 lbs)
 Eyewear: Unknown
 Seat Type: Not seated, retrieving airway supplies from the forward left supply cabinet at time of crash
 Seat Track Position: N/A
 Manual Restraint Usage: None
 Usage Source: Driver
 Air Bags: None
 Alcohol/Drug Involvement: None
 Egress from Vehicle: Removed by EMS through patient loading doors
 Transport from Scene: Ground ambulance to trauma center
 Medical Treatment: Admitted to trauma center for two days

OTHER ROW PASSENGER, EMT INJURIES

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1	Fracture, non-displaced, left superior pubic ramus at its junction with the pubic symphysis; nonoperative; patient weight bearing as tolerated	856151.2,4	Right side interior surface, other: ambulance patient compartment	Probable
2 3 4	Fractures, mildly displaced, left transverse processes of L ₂ , L ₃ , and L ₄ , not further specified	650620.2,8 650620.2,8 650620.2,8	Roof	Probable
5	Contusion (bruising) lower midline back, not further specified	410402.1,8	Roof	Probable

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
6	Traumatic herniation of extraperitoneal fat through left flank defect just lateral to left iliac bone	510099.1,2	Right side interior surface, other: ambulance patient compartment	Probable
7	Contusion left flank adjacent to left flank herniation, not further specified	510402.1,2	Right side interior surface, other: ambulance patient compartment	Probable
8	Contusion (bruising) right flank, not further specified	510402.1,1	Other interior object: ambulance patient cot	Possible
9	Contusion (bruise, ecchymosis), small, left lower abdomen over anterior superior iliac spine	510402.1,2	Other interior object: ambulance patient cot	Possible
10	Abrasion over right scapula, not further specified	710202.1,1	Other interior object: ambulance patient cot	Possible
11	Abrasions bilateral arms above right elbow, on right lower arm, and on left lower arm, not further specified	710202.1,3	Other interior object: ambulance patient cot	Possible
12	Contusion left buttock adjacent to left flank herniation, not further specified	810402.1,2	Roof	Probable
13	Abrasions bilateral lower legs on shins, not further specified	810202.1,3	Other interior object: ambulance patient cot	Possible

Sources: *Emergency Room Records, Hospitalization Records, and EMS treatment Record.* Injury Numbers 5, 8-11, and 13 came from *Emergency Room Records*. Injury Numbers 1-4, 6-7, and 12 came from a combination of *Emergency Room* and *Hospitalization Records*.

OTHER ROW PASSENGER, EMT KINEMATICS

At the time of the initial impact, the EMT was retrieving airway supplies from the forward left supply cabinet. The impact on the right plane of the ambulance displaced the EMT forward and to the right and he probably contacted the front right storage cabinet. As the vehicle rolled over, right side leading, the EMT was redirected to the right and toward the roof. He sustained a fracture of the left superior pubic ramus and a traumatic herniation to the left flank from contacting the right side of the patient compartment. He sustained fractures of the left transverse processes of L₂, L₃, and L₄ from contact to the roof of the patient compartment. He also sustained multiple contusions and abrasions from contact with the roof and patient cot during the rollover. The EMT was removed from the ambulance by EMS through the patient loading doors and transported by ground ambulance to a trauma center where he was admitted for two days.

OTHER ROW PASSENGER, PATIENT DEMOGRAPHICS

IN11015

Age/Sex: 47 years/male
 Height: 150 cm (59 in)
 Weight: 43 kg (95 lbs)
 Eyewear: Unknown
 Seat Type: Supine on patient cot, head/upper torso elevated approximately 32 degrees
 Seat Track Position: N/A
 Manual Restraint Usage: Torso and leg restraints on cot, shoulder straps not used
 Usage Source: Driver
 Air Bags: None
 Alcohol/Drug Involvement: None
 Egress from Vehicle: Removed by EMS through patient loading doors
 Transport from Scene: Ground ambulance to trauma center
 Medical Treatment: Admitted, expired six days post-crash

OTHER ROW PASSENGER, PATIENT INJURIES

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1	Hematoma, epidural, 3.5 x 2.3 cm (1.4 x 0.9 in) in greatest dimension, right middle cranial fossa (temporal region) compatible with active bleeding ¹	140636.5,1	Left side interior surface, other: EMT work area cabinet	Probable
2	Brain swelling with mild effacement of right lateral ventricle, with 4 mm (0.16 in) right-to-left midline deviation at level of foramen Monro ² ; there was mild sulcal effacement over right frontal region but basilar cisterns were patent	140662.3,1	Left side interior surface, other: EMT work area cabinet	Probable
3	Pneumocephalus, trace, within inferior right frontal region, not further specified	140682.3,1	Left side interior surface, other: EMT work area cabinet	Probable
4	Hemorrhage, subarachnoid, trace, within right frontal region, not further specified	140693.2,1	Left side interior surface, other: EMT work area cabinet	Probable

¹ A craniotomy was performed with evacuation of the hematoma.

² In intracranial pressure monitor (ICP) was placed and initially the ICP=12. The ICP did not elevate, and it was subsequently removed. The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:
foramen (fo-ra'men): a natural opening or passage; a general term for such a passage, especially one into or through a bone.
f of Monro: *f. interventriculare*.
interventricular foramen, foramen interventriculare: a passage through which the lateral and third ventricles communicate.

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
5 6	Infarcts ³ , multiple punctate lacunar, in subcortical white matter and bilateral thalamic	140676.3,1 140676.3,2	Left side interior surface, other: EMT work area cabinet	Probable
7	Fracture, non-displaced, linear, involving greater wing of right sphenoid bone and extending into lower right middle cranial fossa	150200.3,8	Left side interior surface, other: EMT work area cabinet	Probable
8	Fracture, non-displaced, horizontally oriented, right temporal bone, not further specified	150402.2,1	Left side interior surface, other: EMT work area cabinet	Probable
9	Fracture, non-displaced, of tip of left T ₃ transverse process	650420.2,7	Left side interior surface, other: EMT work area cabinet	Probable
10	Abrasion, right cornea	240602.1,1	Left side interior surface, other: EMT work area cabinet	Probable
11	Hematoma, right supraorbital (retrobulbar) with right globe proptosis ⁴	241299.1,1	Left side interior surface, other: EMT work area cabinet	Probable

³ The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:

infarct (in'fahrkt): an area of coagulation necrosis in a tissue due to local ischemia resulting from obstruction of circulation to the area, most commonly by a thrombus or embolus.

infarction (in-fahrk'shen): 1. the formation of an infarct. 2. an infarct.

lacunar infarct: a small (less than 1.5 cm) infarct occurring in the basal ganglia, internal capsule, pons, and white matter of the brain, usually in older hypertensive patients and diabetics; depending on their location, lacunes may be asymptomatic or cause significant impairment. When multiple infarcts are present, the condition is called *status lacunaris*.

thalamic (tha-lam'ik): pertaining to the thalamus.

thalamus (thal'ms) [L., from Gr. Thalamos inner chamber]: a large ovoid mass in the posterior part of the diencephalon forming most of each lateral wall of the third ventricle, composed chiefly of gray substance and associated laminae of white substance. It is divided into anterior, medial, and lateral parts, each part containing groups of nuclei that function as relay centers for sensory impulses and cerebellar and basal ganglia projections to the cerebral cortex. The main groups of thalamic nuclei are the reticular, anterior, median, medial, medullary, intralaminar, ventrolateral, and posterior nuclei. Some authorities consider the subthalamus part of the thalamus and refer to it as the ventral thalamus, calling the posterior part the dorsal thalamus.

⁴ Canthotomy and cantholysis were performed. There was normal intraocular pressures and good perfusion. The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:

canthal (kan'thel): pertaining to a canthus.

cantholysis (kan-thol'-I-sis): surgical division of the canthus of an eye or of a canthal ligament.

Canthotomy (kan-thot'a-me): surgical division of the outer canthus.

canthus (kan'thes) pl. canthi (kan'thi): the angle at either end of the fissure between the eyelids.

exophthalmos (ek'sof-thal'mos) [ex-+Gr opthalmos eye]: abnormal protrusion of the eyeball. Spelled also *exophthalmus*; called also exorbitism and proptosis.

proptosis (prop-to'sis): exophthalmos.

retrobulbar (ret'ro-bul'bar): posterior to the eyeball.

retrobulbar space: the space lying behind the fascia of the bulb of the eye, containing the eye muscles and the ocular vessels and nerves.

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
12	Fracture, non-displaced, lateral right orbit, not further specified	251235.2,1	Left side interior surface, other: EMT work area cabinet	Probable
13	Contusion, small, left lung	441407.2,2	Floor of ambulance, near left medical supply cabinet	Probable
14	Pneumothorax, small, left apical with chronic lung disease	442202.2,2	Floor of ambulance, near left medical supply cabinet	Probable
15	Fracture ribs: left 3 rd to 5 th , and right lateral 7 th ; left 3 rd rib was fracture posteriorly and left 3 rd and 4 th ribs were minimally displaced	450203.3,3	Floor of ambulance, near left medical supply cabinet	Probable
16	Fracture, non-displaced, left scapular wing, not further specified	750951.2,2	Left side interior surface, other: EMT work area cabinet	Possible
17	Fracture superior right iliac bone ⁵ , not further specified	856151.2,4	Floor of ambulance, near left medical supply cabinet	Probable
18	Fracture, comminuted, right proximal (trochanteric region) femur	853151.3,1	Floor of ambulance, near left medical supply cabinet	Probable
19	Fracture, comminuted, oblique, right distal third of femur (diaphyseal) without significant displacement; right floating knee	853271.3,1	Floor of ambulance, near left medical supply cabinet	Probable
20	Fracture, comminuted, medially displaced, left subtrochanteric femur (femoral diaphysis)	853271.3,2	Floor of ambulance, near left medical supply cabinet	Probable
21	Fracture, spiral, right tibia, mid diaphyseal (shaft) with displacement, 4 mm (0.16 in) laterally, 6 mm (0.24 in) anteriorly	854251.2,1	Floor of ambulance, near left medical supply cabinet	Probable
22	Fracture, oblique, right fibula, mid diaphyseal (shaft) with displacement, 2 mm (0.08 in) laterally, 3 mm (0.12 in) anteriorly	854471.2,1	Floor of ambulance, near left medical supply cabinet	Probable

⁵ As a result of this patient's 16 years of incomplete quadriplegia, this patient had chronic deformities of her pelvis with bilateral hip disarticulations; dextro curvature of her thoracic spine with chronic right upper rib deformities. In addition, there was bony demineralization. A Girdlestone procedure had been performed on her right hip.

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
23	Fracture, comminuted, impacted, left proximal tibia metaphysis ⁶	854271.2,2	Floor of ambulance, near left medical supply cabinet	Probable
24	Fracture, impacted, 8 mm (0.3 in) proximal left fibular diaphysis	854471.2,2	Floor of ambulance, near left medical supply cabinet	Probable
25	Contusion (bruising) over right temple area, not further specified	110402.1,1	Left side interior surface, other: EMT work area cabinet	Probable
26	Abrasion on face, not further specified	210202.1,9	Left side interior surface, other: EMT work area cabinet	Probable
27	Laceration on forehead over right eye, not further specified	210600.1,7	Left side interior surface, other: EMT work area cabinet	Probable
28	Laceration over left forehead, curvilinear and vertically oriented, not further specified	210600.1,7	Left side interior surface, other: EMT work area cabinet	Probable
29	Contusion (bruising) along mid back, not further specified	410402.1,6	Other interior object: ambulance patient cot	Probable

Sources: *Emergency Room Records, Hospitalization Records, and Coroner's Verdict*. Injury Numbers 1-24 came from Hospitalization Records. Injury Numbers 25-29 came from ER Records. The Coroner's Verdict made non-specific reference to the vast majority of this patient's injuries.

⁶ The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:

epiphysis (e-pif'e-sis): the expanded articular end of a long bone, developed from a secondary ossification center, which during the period of growth is either entirely cartilaginous or is separated from the shaft by the epiphyseal cartilage.

metaphysis (me-taf'e-sis): the wider part at the extremity of the shaft of a long bone, adjacent to the epiphyseal disk. During development it contains the growth zone and consists of spongy bone; in the adult it is continuous with the epiphysis.

The patient was restrained on the cot by the torso and leg restraints. The shoulder straps were not in use. She was facing rearward and her head/upper torso was elevated approximately 32 degrees. The rail clamp frame on the patient cot fractured during the crash and the cot separated from the rail clamp. The cot was displaced to the right and toward the roof during the rollover. The foot end contacted the supply cabinet located at the back right side of the patient compartment and the bottom of the cot contacted the roof (**Figure 14**). The cot was upside down when the patient contacted the left EMT work area cabinet and floor (**Figure 15**) as the vehicle touched down on its wheels at the end of the rollover. The patient remained restrained on the cot and came to final rest face down on the floor between the left EMT work area cabinet and the rail clamp with the cot on top of her. She sustained an epidural hematoma, brain swelling, pneumocephalus, subarachnoid hemorrhage, multiple punctate infarcts in the subcortical white matter and bilateral thalamic, fractures of the right sphenoid bone, right temporal bone, right orbit, and transverse process of T₃ from contacting the left EMT work area cabinet. She sustained a contusion of the left lung, pneumothorax, fractures of left ribs 3-5, right iliac bone, right proximal femur, left femur, right tibia, and left fibula from contacting the floor. The patient also sustained multiple contusions, lacerations, and abrasions. She was removed from the ambulance by EMS through the patient loading doors and transported by ground ambulance to a trauma center where she was admitted for treatment of her injuries. The patient expired six days following the crash.



Figure 14: Yellow tape shows contact marks from patient cot on right side supply cabinet and roof



Figure 15: Arrow shows area of probably patient contact to EMT work area; the patient came to final rest face down on the floor between the EMT work area and the rail clamp with the cot on top of her

2004 CHRYSLER TOWN & COUNTRY

DESCRIPTION

The 2004 Chrysler Town & Country was a front wheel drive, 7-passenger, 4-door, minivan (VIN: 1C4GP44R34Rxxxxxx) equipped with a 3.3-liter, V-6 engine, 4-speed automatic transmission, 4-wheel anti-lock brakes, and driver and front right passenger dual stage frontal air bags.

The vehicle manufacturer's recommended tire size was P215/70R15. The vehicle was equipped with tires of the recommended size. The recommended cold tire pressure for the front and rear tires was 248 kPa (36 psi). The tire data for the Chrysler are presented in the table below.

<i>Position</i>	<i>Measured Pressure</i>	<i>Measured Tread Depth</i>	<i>Restricted</i>	<i>Damage</i>
LF	262 kPa (38 psi)	7 mm (9 /32 in)	No	None
LR	207 kPa (30 psi)	6 mm (7 /32 in)	No	None
RR	207 kPa (30 psi)	6 mm (7 /32 in)	No	None
RF	Flat	7 mm (9 /32 in)	Yes	Bead separation

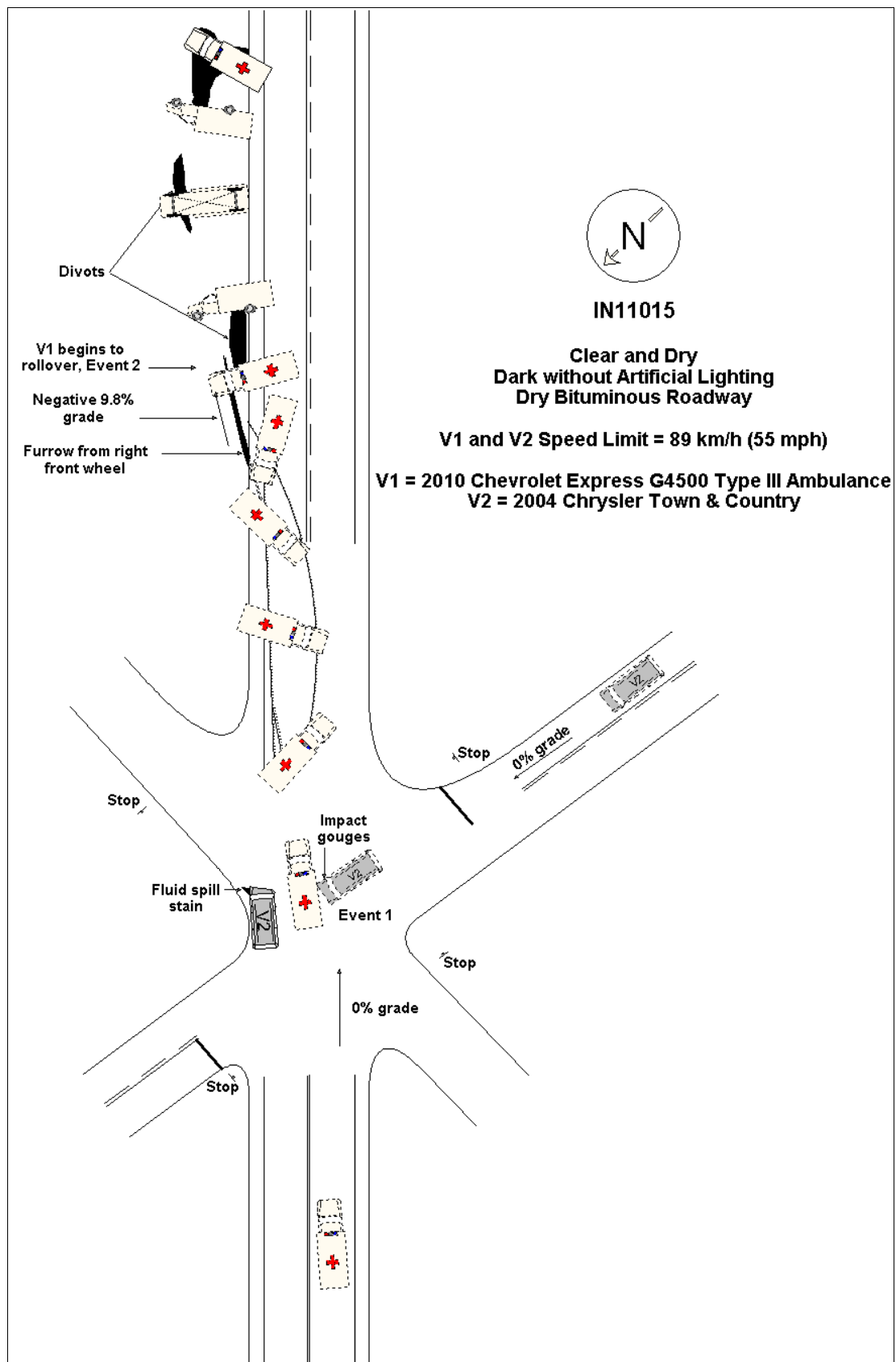
EXTERIOR DAMAGE

Exterior Damage: The Chrysler sustained front plane damage during the impact with the ambulance. The front bumper, grille, hood, both headlamp/turn signal assemblies, and the right fender sustained direct contact damage. The direct damage began at the front left bumper corner and extended 160 cm (63 in) across the full width of the front end. The Field L was 116 cm (45.7 in). Crush measurements were taken at the bumper level and the maximum residual crush was 54 cm (21.3 in) occurring at C₆. The crush values were: C₁=7 cm (2.8 in), C₂= 10 cm (3.9 in), C₃=31 cm (12.2 in), C₄= 45 cm (17.7 in), C₅= 46 cm (18.1 in), C₆= 54 cm (21.3 in).

Damage Classification: The CDC for the front plane damage was 10FDEW3 (300 degrees). Since the ambulance was an out of scope vehicle for the WinSMASH program, the Damage algorithm of WinSMASH was used to calculate a Barrier Equivalent Speed (BES) for the Chrysler. The calculated BES was 28 km/h (17.4 mph).

OCCUPANT DATA

Based on the police crash report, the driver of the Chrysler (60-year-old female) was restrained by the lap-and-shoulder safety belt. The driver was transported by ground ambulance to a hospital. She sustained police-reported A (incapacitating) injuries. Her injury and treatment status was not determined.



Attachment A
2010 Chevrolet Express G4500 Type III Ambulance
Event Data Recorder (EDR) Report

IMPORTANT NOTICE: Robert Bosch LLC and the manufacturers whose vehicles are accessible using the CDR System urge end users to use the latest production release of the Crash Data Retrieval system software when viewing, printing or exporting any retrieved data from within the CDR program. Using the latest version of the CDR software is the best way to ensure that retrieved data has been translated using the most current information provided by the manufacturers of the vehicles supported by this product.

CDR File Information

User Entered VIN	1GB9G5B63A1*****
User	
Case Number	
EDR Data Imaging Date	05/11/2011
Crash Date	
Filename	IN11015_V1_ACM.CDRX
Saved on	Wednesday, May 11 2011 at 11:46:35
Collected with CDR version	Crash Data Retrieval Tool 3.7
Reported with CDR version	Crash Data Retrieval Tool 4.3
EDR Device Type	Airbag Control Module
Event(s) recovered	Non-Deployment

Comments

No comments entered.

Data Limitations

Recorded Crash Events:

There are two types of recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event records data but does not deploy the air bag(s). The minimum SDM Recorded Vehicle Velocity Change, that is needed to record a Non-Deployment Event, is five MPH. A Non-Deployment Event may contain Pre-Crash and Crash data. The SDM can store up to one Non-Deployment Event. This event can be overwritten by an event that has a greater SDM recorded vehicle velocity change. This event will be cleared by the SDM, after approximately 250 ignition cycles. This event can be overwritten by a second Deployment Event, referred to as Deployment Event #2, if the Non-Deployment Event is not locked. The data in the Non-Deployment Event file will be locked, if the Non-Deployment Event occurred within five seconds of a Deployment Event. A locked Non Deployment Event cannot be overwritten or cleared by the SDM. The second type of SDM recorded crash event is the Deployment Event. It also may contain Pre-Crash and Crash data. The SDM can store up to two different Deployment Events. If a second Deployment Event occurs any time after the Deployment Event, the Deployment Event #2 will overwrite any non-locked Non-Deployment Event. Deployment Events cannot be overwritten or cleared by the SDM. Once the SDM has deployed an air bag, the SDM must be replaced.

Data:

-SDM Recorded Vehicle Velocity Change reflects the change in velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Velocity Change is the change in velocity during the recording time and is not the speed the vehicle was traveling before the event, and is also not the Barrier Equivalent Velocity. For Deployment Events, the SDM will record 220 milliseconds of data after Deployment criteria is met and up to 70 milliseconds before Deployment criteria is met. For Non-Deployment Events, the SDM can record up to the first 300 milliseconds of data after algorithm enable. Velocity Change data is displayed in SAE sign convention.

-The CDR tool displays time from Algorithm Enable (AE) to time of Deployment command in a Deployment event and AE to time of maximum SDM recorded vehicle velocity change in a Non-Deployment event. Time from AE begins when the first air bag system enable threshold is met and ends when Deployment command criteria is met or at maximum SDM recorded vehicle velocity change. Air bag systems such as frontal, side, or rollover, may be a source of an enable. The time represented in a CDR report can be that of the enable of one air bag system to the Deployment time of another air bag system.

-Maximum Recorded Vehicle Velocity Change is the maximum square root value of the sum of the squares for the vehicle's combined "X" and "Y" axis change in velocity.

-Event Recording Complete will indicate if data from the recorded event has been fully written to the SDM memory or if it has been interrupted and not fully written.

-SDM Recorded Vehicle Speed accuracy can be affected by various factors, including but not limited to the following:

- Significant changes in the tire's rolling radius
- Final drive axle ratio changes
- Wheel lockup and wheel slip

-Brake Switch Circuit Status indicates the open/closed state of the brake switch circuit.

-Pre-Crash data is recorded asynchronously.

- Pre-Crash Electronic Data Validity Check Status indicates "Data Invalid" if:
 - The SDM receives a message with an "invalid" flag from the module sending the pre-crash data
 - No data is received from the module sending the pre-crash data
 - No module is present to send the pre-crash data
- Driver's and Passenger's Belt Switch Circuit Status indicates the status of the seat belt switch circuit.
- The Time Between Non-Deployment to Deployment Events is displayed in seconds. If the time between the two events is greater than five seconds, "N/A" is displayed in place of the time. If the value is negative, then the Deployment Event occurred first. If the value is positive, then the Non-Deployment Event occurred first.
- If power to the SDM is lost during a crash event, all or part of the crash record may not be recorded.
- The ignition cycle counter relies upon the transitions through OFF->RUN->CRANK power-moding messages, on the GMLAN communication bus, to increment the counter. Applying and removing of battery power to the module will not increment the ignition cycle counter.
- All data should be examined in conjunction with other available physical evidence from the vehicle and scene

Data Source:

All SDM recorded data is measured, calculated, and stored internally, except for the following:

- Vehicle Status Data (Pre-Crash) is transmitted to the SDM, by various vehicle control modules, via the vehicle's communication network.
- The Belt Switch Circuit is wired directly to the SDM.

01006_SDMCG_r002

Multiple Event Data

Associated Events Not Recorded	3
Event(s) was an Extended Concatenated Event	No
An Event(s) was in Between the Recorded Event(s)	No
An Event(s) Followed the Recorded Event(s)	Yes
The Event(s) Not Recorded was a Deployment Event(s)	No
The Event(s) Not Recorded was a Non-Deployment Event(s)	Yes

System Status At AE

Low Tire Pressure Warning Lamp (If Equipped)	OFF
Vehicle Power Mode Status	Run
Remote Start Status (If Equipped)	Inactive
Run/Crank Ignition Switch Logic Level	Active

Pre-crash data

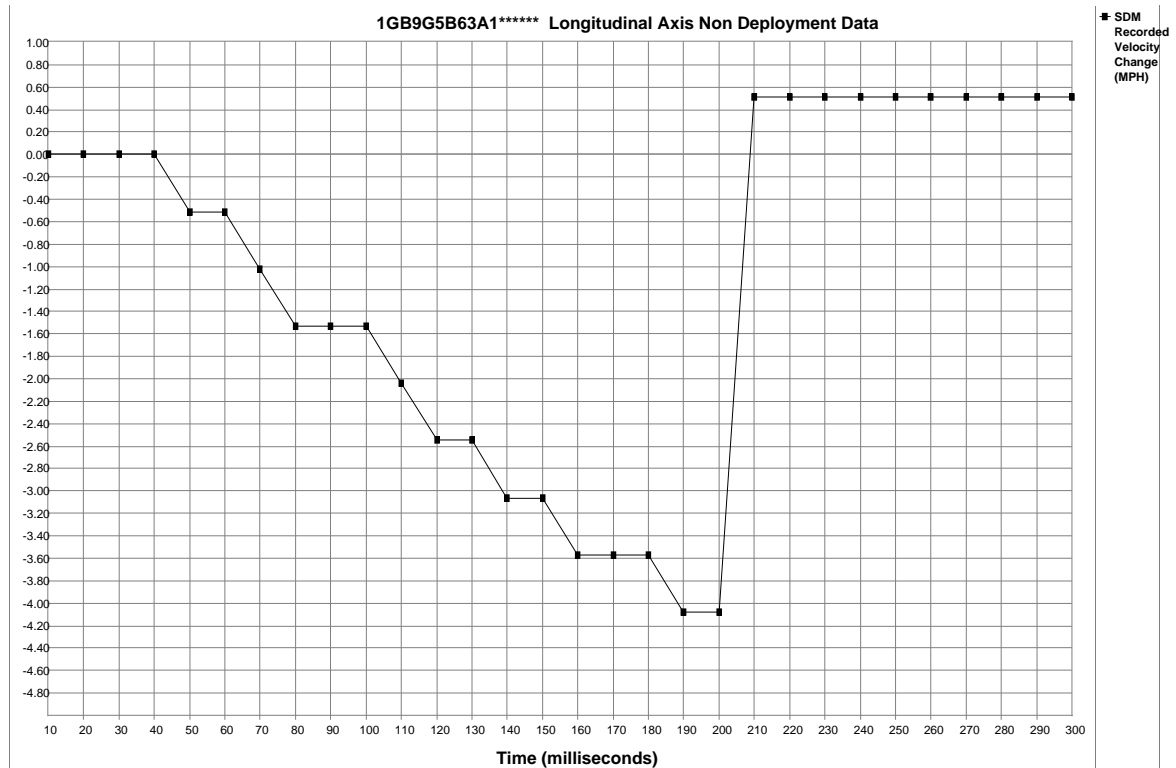
Parameter	-1.0 sec	-0.5 sec
Reduced Engine Power Mode	OFF	OFF
Cruise Control Active (If Equipped)	No	No
Cruise Control Resume Switch Active (If Equipped)	No	No
Cruise Control Set Switch Active (If Equipped)	No	No
Engine Torque (foot pounds)	393.51	418.22

Pre-Crash Data

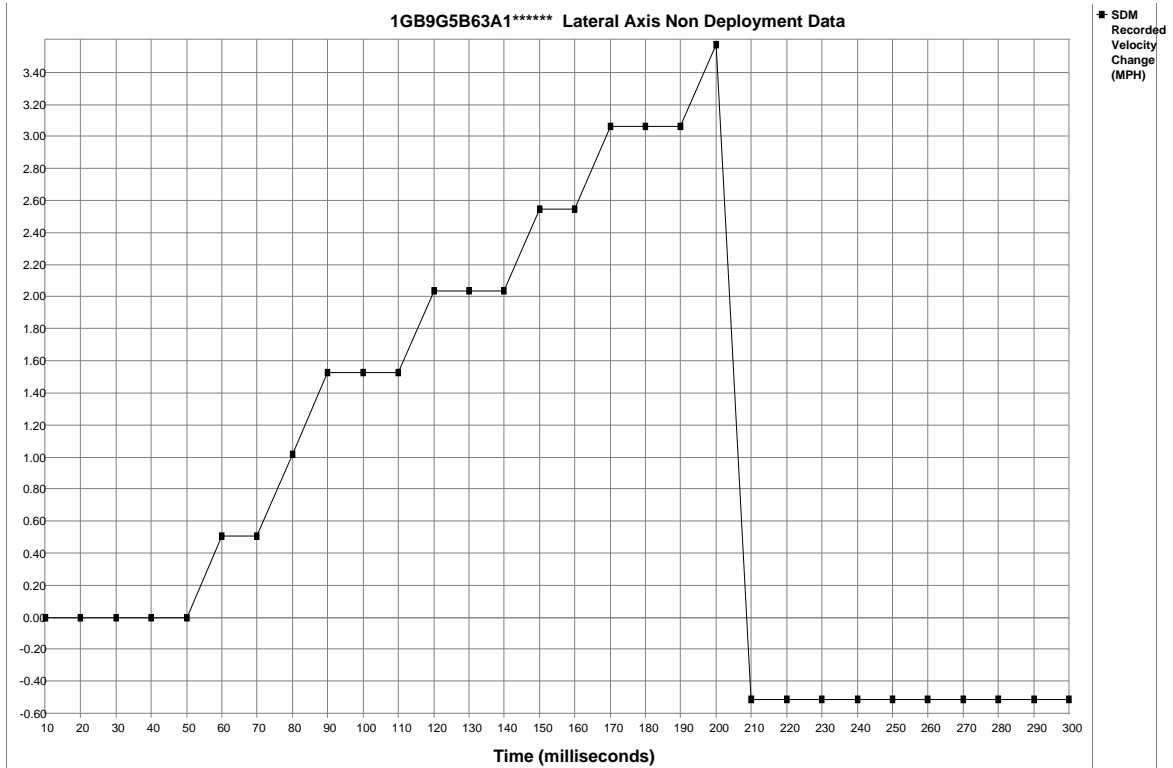
Parameter	-2.5 sec	-2.0 sec	-1.5 sec	-1.0 sec	-0.5 sec
Accelerator Pedal Position (percent)	33	36	77	100	100
Vehicle Speed (MPH)	62	62	62	62	62
Engine Speed (RPM)	1792	1792	1856	2496	2688
Percent Throttle	33	33	52	100	100
Brake Switch Circuit State	OFF	OFF	OFF	OFF	OFF

System Status At Non-Deployment

Ignition Cycles At Investigation	1337
SIR Warning Lamp Status	OFF
SIR Warning Lamp ON/OFF Time Continuously (seconds)	655350
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	1331
Ignition Cycles At Event	1336
Ignition Cycles Since DTCs Were Last Cleared	255
Driver's Belt Switch Circuit Status	UNBUCKLED
Diagnostic Trouble Codes at Event, fault number: 1	N/A
Diagnostic Trouble Codes at Event, fault number: 2	N/A
Diagnostic Trouble Codes at Event, fault number: 3	N/A
Diagnostic Trouble Codes at Event, fault number: 4	N/A
Diagnostic Trouble Codes at Event, fault number: 5	N/A
Diagnostic Trouble Codes at Event, fault number: 6	N/A
Diagnostic Trouble Codes at Event, fault number: 7	N/A
Diagnostic Trouble Codes at Event, fault number: 8	N/A
Diagnostic Trouble Codes at Event, fault number: 9	N/A
Maximum SDM Recorded Velocity Change (MPH)	5.77
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	200
Crash Record Locked	No
Deployment Event Recorded in the Non-Deployment Record	No
Multiple Event Data/Vehicle Event Data (Pre-Crash) Associated With This Event	No
Event Recording Complete	Yes
Driver First Stage Deployment Loop Commanded	No
Passenger First Stage Deployment Loop Commanded	No
Driver Second Stage Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded for Disposal	No
Passenger Second Stage Deployment Loop Commanded	No
Passenger 2nd Stage Deployment Loop Commanded for Disposal	No
Driver Pretensioner Deployment Loop Commanded (If Equipped)	No
Passenger Pretensioner Deployment Loop Commanded (If Equipped)	No
Driver Side Deployment Loop Commanded (If Equipped)	No
Passenger Side Deployment Loop Commanded (If Equipped)	No
Second Row Left Side Deployment Loop Commanded (If Equipped)	No
Second Row Right Side Deployment Loop Commanded (If Equipped)	No
Driver (Initiator 1) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Passenger (Initiator 1) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver (Initiator 2) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Passenger (Initiator 2) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver (Initiator 3) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Passenger (Initiator 3) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver Knee Deployment Loop Commanded (If Equipped)	No
Passenger Knee Deployment Loop Commanded (If Equipped)	No
Second Row Left Pretensioner Deployment Loop Commanded (If Equipped)	No
Second Row Right Pretensioner Deployment Loop Commanded (If Equipped)	No
Second Row Center Pretensioner Deployment Loop Commanded (If Equipped)	No



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
SDM Longitudinal Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	-0.51	-0.51	-1.02	-1.53	-1.53	-1.53	-2.04	-2.55	-2.55	-3.06	-3.06
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
SDM Longitudinal Axis Recorded Velocity Change (MPH)	-3.57	-3.57	-3.57	-4.08	-4.08	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
SDM Lateral Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.51	0.51	1.02	1.53	1.53	1.53	2.04	2.04	2.04	2.55
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
SDM Lateral Axis Recorded Velocity Change (MPH)	2.55	3.06	3.06	3.06	3.57	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51

Hexadecimal Data

Data that the vehicle manufacturer has specified for data retrieval is shown in the hexadecimal data section of the CDR report. The hexadecimal data section of the CDR report may contain data that is not translated by the CDR program. The control module contains additional data that is not retrievable by the CDR system.

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$0D 00 00 00 00 00 00 00
$0E 00 00 00 00 00 00 00
$0F 00 00 00 00 00 00 00
$10 01 00 00 00 00 00 00
$11 07 FF FF 00 81 00 00
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$3C 63 FF 05 39 01 05 39
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$40 FE FE C5 5D 53 00 00
$41 00 00 00 00 00 00 90
$42 2A 27 1D 1C 1C 00 00
$43 0B 0E 0A CB 00 00 00
$44 FF FF 85 54 53 00 00
$45 63 63 63 63 63 00 00
$46 2B 2F C0 00 00 00 00
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